

Acacia wollarensis (Fabaceae, Mimosoideae sect. *Botrycephalae*), a distinctive new species endemic to the Hunter Valley of New South Wales, Australia

Stephen AJ Bell and Colin Driscoll

School of Environmental and Life Sciences, University of Newcastle, Callaghan 2308
stephen.bell@newcastle.edu.au; colin.driscoll@newcastle.edu.au

Abstract

Acacia wollarensis (Fabaceae, Mimosoideae sect. *Botrycephalae*), a new and restricted species from the upper Hunter Valley of New South Wales, is described and illustrated. The new taxon has affinities to *Acacia fulva* and the rare *A. chrysotricha*, but differs from these most prominently in the densely white-setose rachis and pinnules. At present, the new taxon is known only from two populations and under IUCN guidelines qualifies as vulnerable, but is not under immediate threat.

Introduction

Recent vegetation surveys undertaken in the Wollar district of the upper Hunter Valley of New South Wales included the collection of an unknown species of bipinnate *Acacia* section *Botrycephalae*. The novelty was immediately recognised as distinct from all other locally occurring *Acacia* species by the densely white-villous branchlets, and leaves bearing prominent white-setose pinnules. Although initially postulated to be a form of the Hunter region endemic *Acacia fulva*, subsequent investigations failed to accommodate this taxon within that or any other New South Wales or Australian species, and it is here described as new. Morphologically, the new taxon appears closest to *A. chrysotricha*, with which it shares similarities in habit and habitat.

Taxonomy

Acacia wollarensis S.A.J.Bell & Driscoll *sp. nov.*

Differs from *Acacia chrysotricha* predominantly by the villous to setose branchlets of short (0.3–0.8 mm) erect to slightly spreading white hairs, the prominently ridged and densely setose rachis, the prominently setose and slightly longer (4–5 mm) pinnules with a prominently impressed midvein, the appressed white-pubescent peduncles, the near-glabrous corolla lobes, the twisted and folded funicle, and the light green new growth.

Type: Australia: New South Wales: Central Western Slopes: off Araluen Road, c. 3.2 km NE of Wollar, Upper Hunter Valley (32°20'S, 149°58'E), S.A.J. Bell 4933 & C. Driscoll, 24 Sep 2015 (holo: NSW [NSW821499]; iso: BRI, CANB, NE).

Erect tree 12–20 m high. *Bark* greyish, smooth when young but becoming brown, rough and furrowed with age. *Branchlets* terete with broad, often indistinct rounded ridges, densely villous with spreading white hairs of two lengths, the smaller hairs 0.3–0.5 mm long forming a continuous indumentum, with scattered emergent longer hairs 0.7–1.0 mm long. *Leaves* obovate in outline, light green on new growth, mid-green when mature, +/- sessile; petiole 2–4 mm long, densely villous with spreading white hairs c. 1 mm long; rachis 53–95 mm long, prominently and narrowly ridged above, densely villous with spreading white hairs c. 1 mm long; jugary glands large, dark brown, prominently raised, circular to broadly elliptic, 0.6–1.0 mm diam., at base of upper 1–4 pairs of pinnae and occasionally on lower 1 or 2 pairs; pinnae 10–14(–16) pairs, 13–61 mm long, lowermost pairs shorter than others, near-uppermost pairs the longest; rachilla narrowly-ridged above, densely pubescent with spreading white hairs c. 1 mm long, with glabrous, small dark brown circular jugary or near-jugary glands, c. 0.3 mm diam., present at the base of uppermost 1–4 pair(s) of pinnules, occasionally present on all or most pairs, or sometimes absent; pinnules dark green above, paler green below, 6–26 pairs per pinna, 3–6 mm long, 1.0–1.7 mm wide, oblong-subulate, with obtuse to subacute apex and recurved margins, midvein impressed above, raised below, setose with scattered white bristles to 0.5 mm on upper side, confined to margins and midvein below. *Inflorescences* of terminal and axillary racemes and panicles. Peduncles 4.5–6.5 mm long, white appressed-pubescent. *Heads* globose, c. 24–31-flowered, c. 4–6 mm diam. (when dry), golden yellow. *Flowers* 5-merous; bracteoles c. 0.5 mm long, spatulate with apex expanded, pink with brown infusions, moderately ciliolate; calyx 5-lobed, 0.5–0.7 mm long, pale yellow-green, lobes broadly triangular; tube glabrous or very sparsely ciliolate along ribs, lobes shortly ciliolate at apex; corolla 1.0–1.5 mm long, yellow, glabrous or with scattered, very short and insignificant white hairs towards apex; ovary shortly hairy with scattered to moderately dense white hairs, style laterally attached; stamens numerous, yellow, the filaments c. 2–3 mm long; anthers bilocular, dorsifixed. *Pods* straight to slightly curved, moniliform, margin moderately and ±regularly constricted between seeds, distinctly raised over seeds, 90–135 mm long, 7–9 mm wide, coriaceous, green becoming light to dark brown at maturity, with fine raised and reticulate lateral veins, scattered white setose with hairs to 0.6 mm long; seeds longitudinal, c. 5–6 mm long, 2–3 mm wide, c. 2 mm deep; arillate; funicle filiform, twisted and folded, almost encircling the seed. Figs 1, 2.

Additional specimens examined: NEW SOUTH WALES: CENTRAL WESTERN SLOPES: Private lands, near Wollar, Upper Hunter Valley, S.A.J. Bell s.n. & C. Driscoll, 4 Sep 2014 (NSW986093); opposite “Wollarah Downs”, Wollar, S.A.J. Bell 4936 & C. Driscoll, 15 Sep 2015 (DMHN, K, PERTH); NE of Wollar (type locality), C. Driscoll s.n., 1 Oct 2015 (AD, MEL); NE of Wollar (type locality), C. Driscoll s.n., 3 Nov 2015 (NSW).

Flowering: Flowers have been observed in early to late September, with pods developing in November and December. Mature seed has been collected in December and as late as January.

Distribution: Known only from the Parish of Wollar in the upper Hunter Valley, 120 km west of Muswellbrook and 50 km northeast of Mudgee, on the Central Western Slopes of New South Wales (Fig. 3). Considerable survey effort has been expended in this part of the upper Hunter Valley since the mid-1990s, but no collections referable to *A. wollarensis* have been recorded. Surveys of the nearby Goulburn River National Park (Hill 1999) and Munghorn Gap Nature Reserve (Hill 1999, NSW DEC 2004), and private lands associated with current and proposed coal mines in the area (e.g. FloraSearch 2005, Ecovision 2008, Wells Environmental Services 2011, Bell & Driscoll 2014) have not located additional populations. Further afield, similar habitats in northern Wollemi National Park (Bell 1998, NSW OEH 2012), Manobalai Nature Reserve and adjacent crown lands (Bell 1997, Peake 1999), and the Myambat army base near Denman (Fallding et al 1997, Jacobs 2014) have likewise not collected similar material.

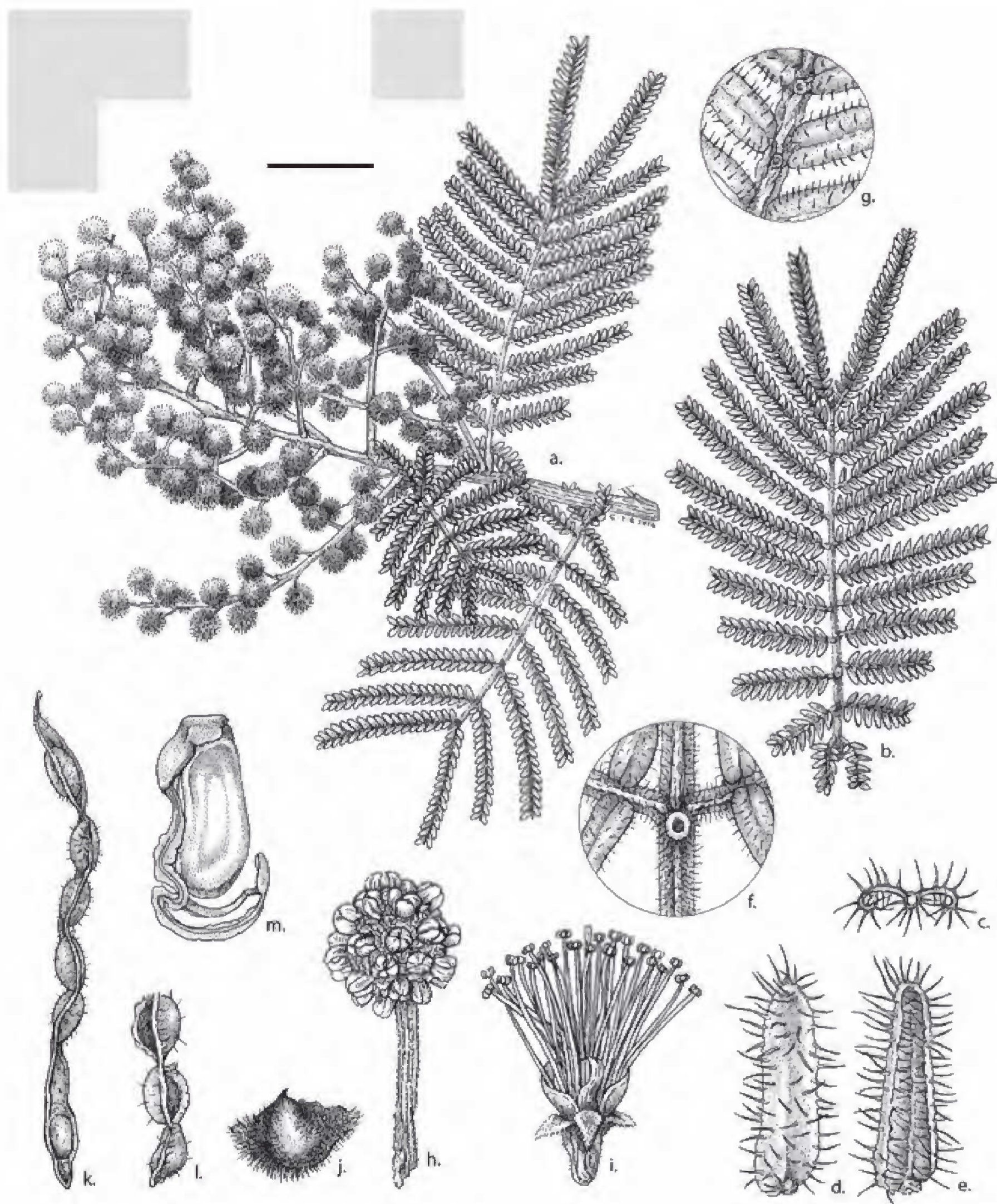


Fig. 1. *Acacia wollarensis*; a, flowering branch; b, leaf; c, pinnule, section; d, pinnule, upper surface; e, pinnule, lower surface; f, rachis gland; g, rachilla glands; h, flower head, in bud; i, individual flower; j, bracteole; k, seed pod; l, pod detail; m, seed. Scale bar: a = 15 mm; b = 20 mm; c = 1.5 mm; d-e = 2 mm; f-g = 2 mm; h = 4 mm; i = 1 mm; j = 0.5 mm; k = 20 mm; l = 15 mm; m = 4 mm (a-j from isotype; k-m from C. Driscoll s.n., 13 Dec 2016). Artist: Chris Rockley.



Fig. 2. *Acacia wollarensis*. From top left; new growth, adult leaf showing setose hairs backlit by sunlight, flowering inflorescence, immature pods, seed and aril, trunk and bark from mature specimen.

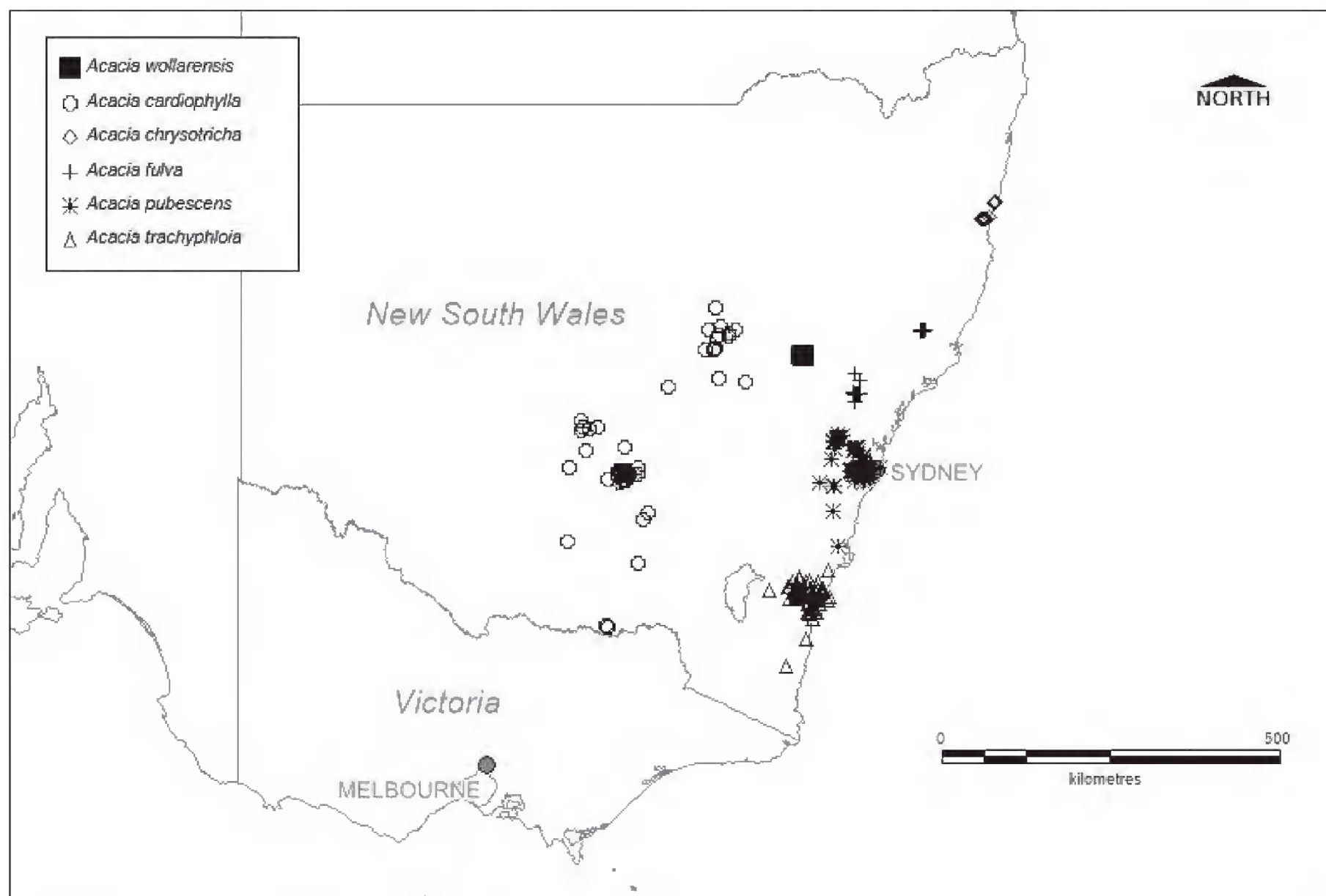


Fig. 3. Distribution of *Acacia wollarensis* and morphologically similar species. Source: AVH (accessed 9 November 2016) and personal records.

Habitat: Both known populations of *Acacia wollarensis* occur in sheltered gullies or on mid to lower slopes, at the interface of Triassic Narrabeen sandstones and Permian claystones and shales. Best development occurs at the foot of the sandstone cliff lines which characterise the Narrabeen geology, at easterly to south-easterly aspects, and in deep, sandy colluviums eroded from the sandstone and shale. In these areas, *A. wollarensis* commonly forms a dense sub-canopy below the emergent eucalypts *Eucalyptus punctata* and *E. sparsifolia* (Fig. 4). Understorey species include occasional shrubs of *Persoonia linearis*, *Cassinia decipiens*, *Phebalium squamulosum* subsp. *gracile* and *Bursaria spinosa*, with *Lomandra confertifolia* subsp. *rubiginosa*, *Rytidosperma longifolium*, *Poranthera microphylla*, *Cheilanthes sieberi* subsp. *sieberi*, *Stellaria flaccida*, *Galium propinquum* and *Gonocarpus humilis* in the ground layer. In the denser and better developed *Acacia* stands, little or no other species are present in the ground layer, which is largely represented by leaf litter and bare soil. Scattered individuals of *A. wollarensis* are also present on the gently undulating lower slopes on Permian geology, within a wider matrix of open forest dominated by *Eucalyptus albens*, *E. dawsonii*, *Callitris endlicheri* and *Angophora floribunda*. Understorey vegetation here includes *Bursaria spinosa*, *Cassinia quinquefaria* and *Dodonaea viscosa*. Upslope, occasional individuals are also present in fissures and cracks in cliff lines. At the time of survey in 2015 and 2016, very few juvenile plants were observed. The sandstone substrate above the densest stands of *A. wollarensis* were observed in January 2016 to support extensive areas of cyanobacteria, moss and lichen. It is plausible that additional nutrients, such as nitrogen, are deposited into the soils during rain events following liberation from such areas of cyanobacteria after rewetting (cf. Dojani et. al. 2007).



Fig. 4. *Acacia wollarensis* habitat, dominated by *Eucalyptus punctata* and *E. sparsifolia* in the canopy and a sparse understorey. The new taxon is in flower, and dominates the mid-storey.

Ecology: Specimens of *Acacia wollarensis* have been observed attaining a height of 15 m, with occasional individuals extending to 20 m. With age, the trunk and larger branches become fissured and dark brown or black, similar to that reported for *A. chrysotricha* (Tindale 1966). It is likely that major fire and/or earlier clearing events associated with stock grazing c. 50–80 years previously may have promoted germination of the current cohort of individuals, as very few young plants have been seen within the searched populations. There is no evidence of recent fire at either of the two known populations, and regional records suggest that the last fire occurred 55 years previously at the larger stand. It is likely that a fire event of sufficient intensity would stimulate mass germination of soil-stored seed at both locations.

Population size: Both known populations occur along the boundary of private lands and Goulburn River National Park, with plants present in both tenures. At the larger population, several thousand plants occur (<10,000 mature individuals) and dominate the sub-canopy along at least 800 m of escarpment across 5–8 ha, while the smaller population comprises only 50–100 scattered individuals.

Conservation status: *Acacia wollarensis* is known only from two populations approximately 3 km apart, although neither is currently under threat. The smaller population occurs in proposed offset land associated with coal mining activities, which is proposed to be added to the adjoining Goulburn River National Park. The majority of the larger population occurs within Goulburn River National Park, with the remainder in adjoining mine-owned land. Following Briggs and Leigh (1996), a conservation risk code of 2RCa is here proposed, recognising the restricted distribution of the species (<100 km), and the >1000 plants present within Goulburn River National Park and proposed offsets. Under IUCN (2001) guidelines, *A. wollarensis* qualifies as Vulnerable based on criterion D2 (area of occupancy <20 km²; known from <5 locations and prone to human or stochastic events).

Etymology: The specific epithet is a direct reference to the Parish of Wollar, the type location of the new taxon. The pubescent, pilose and setaceous nature of the majority of the plant, particularly the branchlets, rachis and pinnules, suggest an alternative epithet that reflects this feature. However these options are already occupied in *Acacia pubescens* (Vent.) R.Br. and *A. pilosa* Benth. *Acacia setigera* A.Cunn. ex Hook is the basionym of *A. piligera* A.Cunn., but has been avoided here to avoid possible future confusion.

Common name: ‘Wollar Wattle’ is suggested as a suitable common name for this taxon. Horticulturally, this species would prove to be a highly attractive specimen for parks and larger gardens.

Similar species: A combination of key morphological traits (indumentum, seed funicle, pinnule size and shape) in *Acacia wollarensis* distinguish this taxon from other, superficially similar species. The long setose indumentum on the upper and lower pinnule surfaces are distinctive, and are shared by only one other taxon within section *Botrycephalae*. *Acacia cardiophylla*, a widespread shrub from inland New South Wales, supports a similar setose indumentum of whitish hairs on the rachis (slightly shorter and less dense than in *A. wollarensis*) and rachillas (half the length of those on *A. wollarensis*). In addition, the leaves of *A. cardiophylla* are smaller and more delicate (<6 cm long vs mostly >8 cm in *A. wollarensis*), and the ovate and sparsely setose pinnules are considerably smaller (c. one third the length of the pinnules of *A. wollarensis*).

The seed of *Acacia wollarensis* is also very unusual within section *Botrycephalae*. Almost all other members of this section possess seeds with a simple and small or moderately developed aril and funicle (typically encircling ~10–30% of the seed circumference), but in *A. wollarensis* this is well developed, twisted, folded and encircles approximately 60–75% of the seed. This is a trait shared only by the endangered *A. chrysotricha* from the far north coast of New South Wales, and alludes to the likely close relationship existing between these two taxa. Indeed, both species occupy extremely restricted geographical distributions within a similar ecological niche, but in very different environments (dry sclerophyll forest on the New South Wales Central Western Slopes vs wet sclerophyll forest on the New South Wales North Coast).

More broadly, the characteristic of villous or densely spreading branchlet hairs in *Acacia wollarensis* is shared with four other species within section *Botrycephalae*, and in this trait *A. wollarensis* is again closest to *A. chrysotricha* (but golden or fawn in *A. chrysotricha*, white in *A. wollarensis*). Of the remaining three taxa, branchlet hairs are dark brown to dark red-brown in the vulnerable *Acacia pubescens* from the Sydney district, white-to-golden in the moderately common *A. trachyphloia* from the New South Wales South Coast, and cream-coloured in the western *A. cardiophylla*. Additionally, pods are bluish-black and ±pruinose in *A. pubescens* and *A. trachyphloia*, but light brown and non-pruinose in *A. wollarensis*. Of the four species, only *A. chrysotricha* and *A. trachyphloia* are tall, long-lived trees similar in habit to *A. wollarensis*, but both occur in moister forest types.

Within the Sydney region, two species are superficially similar to *Acacia wollarensis*, but can be easily distinguished by habit, indumentum, pinnule and seed characteristics. *Acacia pubescens*, noted above, is a spreading tall shrub and also differs from *A. wollarensis* in pinnule indumentum (glabrous vs setose in *A. wollarensis*), and the colour of new growth (silvery- or yellowish-white vs light green in *A. wollarensis*). The funicle of *A. pubescens* is short and relatively nondescript, contrasting strongly with the well-developed funicle in *A. wollarensis*. The rare and restricted *Acacia fulva*, a tall shrub occurring on isolated basalt plugs, differs from the new species in the larger (4–10 mm long), ovate to elliptic pinnules with an acute or acuminate apex, which in *A. wollarensis* are mostly 3–4 mm long and oblong to subulate with an obtuse apex. The indumentum is also noticeably different; in *A. fulva* the branchlets are velvety with silvery grey to brownish hairs, while in *A. wollarensis* they are villous with dense white hairs. On *A. fulva*, pinnules are weakly lanate-hairy with fawn or silvery hairs, but in *A. wollarensis* the pinnules are setose with erect white hairs. Funicles on *A. fulva* are short with one or two small loops, while those in *A. wollarensis* nearly encircle the seed and are twisted and folded. Like *A. wollarensis*, both of these species occupy highly restricted ranges, with *A. pubescens* threatened by urban development in the Sydney district.

Table 1 summarises the key traits for *A. wollarensis* and these five morphologically similar species, based largely on information provided in the *Flora of Australia*, Volume 11A (2001). A diagnostic key modified from that provided on the National Herbarium digital *Flora of New South Wales* (<http://plantnet.rbg Syd.nsw.gov.au/floraonline.htm>) is provided below, detailing only the relevant leads (*A. wollarensis* and similar species). With slight modifications, *A. wollarensis* can be accommodated after lead 394.

Table 1. Comparison of *Acacia wollarensis* with morphologically similar species (Source: Flora of Australia; World Wide Wattle; Tame 1992).

Character	<i>A. wollarensis</i>	<i>A. cardiophylla</i>	<i>A. chrysotricha</i>	<i>A. fulva</i>	<i>A. pubescens</i>	<i>A. trachyphloia</i>
Habit	erect, small to large tree 12–20 m high	flat-topped shrub or tree, 1–3.3 m high	tree, 6–15(–21) m high	shrub or tree 1.5–10(–15) m high	weeping shrub 1–5 m high	erect shrub or tree 4–15(–18) m tall
Bark	smooth when young, grey, becoming brown, rough and furrowed	smooth, grey or mottled with brown	lightly fissured vertically and grey on young trees, later deeply fissured and dark red-brown	smooth and greyish-green on young trees, later rough and corrugated	smooth, brownish-grey	smooth, grey, becoming rough and corrugated
New growth	light green, villous	cream, villous	deep golden, villous	chestnut, velvety	silvery- or yellowish-white, villous	golden, velvety
Leaf colour	mid green	pale green	dark green above, paler below	silvery-greyish	bright green above, paler below	greenish-grey to dark green
Branchlet texture	terete with broad, often indistinct rounded ridges	terete or obscurely angled, pruinose	inconspicuously ridged	inconspicuously ridged	+/- terete with low ridges	terete or slightly angled
Branchlet indumentum	villous with spreading white hairs, 0.3–0.8 mm long	spreading +/- stiff cream-coloured hairs, or glabrous	densely clothed with spreading golden (later dark grey or fawn) hairs, 0.8–1.2 mm long	velvety silvery-grey or chestnut hairs 0.8–1 mm long	+/- villous	white- to golden-villous
Petiole length	2–4 mm	0–2 mm	3–10 mm	0–6 mm	0–0.7 mm	1–5 mm
Rachis length	5–10 cm	1–6 cm	5–14 cm	2–8 cm	1.5–6.6 cm	2–11 cm
Rachis texture	prominently ridged above, densely setose with white hairs c. 1 mm long	pubescent	densely pubescent with long spreading dark grey, gold or fawn hairs	densely brownish-grey pubescent, terminating in long pubescent seta	ridged, +/- villous with dense spreading hairs	terete, densely pubescent with long spreading golden hairs
Rachis glands	dark brown and prominent raised, circular to broadly elliptic jugary glands at base of upper and lower pairs of pinnae	minute orbicular jugary glands, often inconspicuous or missing	absent, or 1 broadly cup-shaped, dark brown, glabrous gland at lowest or upper 1–3 pairs of pinnae	1–3 minute interjugary glands +/- jugary glands	mostly absent, +/- spherical or ellipsoid pale brown or blackish gland at base of upper pair of pinnae	globose, villous glands at base of upper pair of pinnae
No. pinnae	10–14(–16) pairs	(3–) 8–19 pairs	(8–) 12–18 pairs	4–12 pairs	3–12 pairs	(6–) 9–25 pairs
No. pinnules	6–26 pairs	4–14 pairs	(6–) 12–25 pairs	11–28 pairs	5–50 pairs	(8–) 16–40 pairs
Pinnule shape	oblong-subulate	narrowly ovate, orbicular or oblong	oblong to oblong-elliptic	narrowly lanceolate to ovate or narrowly lanceolate-oblong	lorate to +/- oblong	+/- narrowly oblong or oblong-elliptic
Pinnule length	4–5 mm	0.8–2 mm	3–4.5 mm	3–10 mm	1.5–5 mm	1–2.5(–3) mm
Pinnule width	1–1.7 mm	0.5–1 (–1.3) mm	1–1.5 mm	1–2 (–2.5) mm	0.4–1 mm	0.4–0.6 (–0.8) mm
Pinnule indumentum	setose upper surface & lower midvein	hispidulous especially below & on margins	few long white or golden hairs especially along midvein and margins	lanate with long weak silvery hairs on lower surface and margins, sparsely lanate on upper surface	glabrous	golden, white or subglabrous loosely appressed hairs, especially above
Pinnule midvein	prominently impressed above, raised below	visible	obscure above, raised below	visible above, obscure below	faint	obscure

Character	<i>A. wollarensis</i>	<i>A. cardiophylla</i>	<i>A. chrysostricha</i>	<i>A. fulva</i>	<i>A. pubescens</i>	<i>A. trachyphloia</i>
Pinnule apex	obtuse, occasionally subacute	obtuse, broadly rounded or subacute	acute or subacute	sharply acute to acuminate	acute or subacute	acute or obtuse
Inflorescence	24–31-flowered, golden yellow	16–32-flowered, golden	15–30-flowered, golden	24–48-flowered, bright yellow	8–16-flowered, golden	10–20-flowered, pale to deep yellow
Peduncles	appressed white-pubescent, 4.5–6.5 mm long	sparsely pubescent, 2–3 mm long	golden-pubescent, c. 5 mm long	chestnut-pubescent, 5–10 mm long	slender, glabrous	sparsely golden-pubescent, c. 5 mm long
Corolla lobes	triangular, scattered insignificant white hairs towards apex	short, obtuse, ciliate	short, often ciliate	triangular, ciliate	triangular, glabrous to minute ciliate	triangular, ciliate
Pod dimensions	9–14 cm long, 7–9 mm wide	1.5–11.5 cm long, 4–6.5 mm wide	3–10 cm long, 4–6 mm wide	2–12 cm long, 4–6.5 mm wide	1.5–8 cm long, 4–6.5 mm wide	2–7.5 cm long, 4–8 mm wide
Pod texture	coriaceous, scattered white setose hairs to 0.6 mm	subcoriaceous, with stiff silver hairs	thinly coriaceous, with dark brown or whitish hairs to 2 mm long	thickly coriaceous, velvety with soft chestnut-coloured and silvery hairs 1–1.2 mm long	subcoriaceous	subcoriaceous
Pod colour	light to dark brown	blue-black or dark brown, paler between seeds	dark brown or black	dark brown	bluish, bluish-brown or almost black, +/- pruinose	dark blue or brownish-black, often slightly pruinose
Seed	funicle filiform, twisted and folded, almost encircling the seed, arillate	funicle short, arillate	funicle almost surrounding seed, arillate	funicle with 1–2 loops, arillate	funicle short, arillate	funicle short, arillate

Key to morphologically similar species of *Acacia*, sect. *Botrycephalae*, in New South Wales, including species mentioned in text (adapted from PlantNET)

- 394 New growth chestnut, velvety; pinnules ± ovate to elliptic, mostly 4–10 mm long, silvery hairy; pods ± velvety hairy; funicle short and with 1–2 loops.....*Acacia fulva*
- New growth green to golden, villous; pinnules ± oblong, mostly 3–5 mm long, white to golden hairy or setose; pods ± sparsely to moderately hairy; funicle ¾ to almost encircling the seed 394a
- 394a New growth deeply golden; branchlet indumentum dense with spreading golden, dark grey or fawn hairs; pinnules flat with obscure midvein on upper surface, with few long, white or golden hairs, especially along midvein and margins; pods dark brown to black, with hairs to 2 mm; funicle not folded*Acacia chrysostricha*
- New growth pale green; branchlet indumentum villous with spreading white hairs; pinnules revolute with deeply impressed midvein on upper surface, white-setose upper surface and lower midvein; pods light brown, with hairs to 0.6 mm; funicle folded.....*Acacia wollarensis*
- 395 Pinnules 0.8–1.5 mm long and ± ovate to ± circular, minutely warty..... *Acacia cardiophylla*
- Pinnules usually 1.5–10 mm long, ± oblong or linear, not warty 396
- 396 Leaves with rachis 1–12 mm long; pinnae 1–5 pairs; pinnules glabrous or ciliate; racemes with 2–12 flower heads and axis zigzagged..... *Acacia leptoclada*
- Leaves with rachis 8–65 mm long; pinnae 4–30 pairs, or if only 5 pairs then the rachis of leaves >12 mm long; pinnules glabrous or densely hairy; racemes with mostly 10–50 flower heads, axis not prominently zigzagged 397

- 397 Pinnules silvery to bluish grey, densely hairy, especially on lower surface; widespread species, especially on the ranges and slopes..... 398 (to elsewhere)
- Pinnules ± green, glabrous or hairy, hairs often pale yellowish to grey; south from Lake Conjola (SC, ST) 399
- 399 Branchlets with knobbly ridges and minutely hairy; pinnules ± glabrous except for minutely ciliate margins and tuft of hairs at apex; heads with 30–45 flowers; pods 7–10 mm wide, hairy with ± appressed hairs; extreme far south coast (SC)..... *Acacia constablei*
- Branchlets ± terete, angled or ridged but without knobbly ridges, hairy with long spreading hairs; pinnules glabrous or sparsely hairy; heads with 8–20 flowers; pods 4–8 mm wide, glabrous, ± pruinose; more widespread, south from Lake Conjola (SC, ST) 400
- 400 Petiole 1–5 mm long; rachis 2–11 cm long with orbicular jugary glands at least at upper 2–10 pairs of pinnae, interjugary glands ± absent; pinnules usually 15–40 pairs; from Lake Conjola to the Bodalla district (SC, ST)..... *Acacia trachyphloia*
- Leaves usually sessile; rachis 1.5–6.5 cm long, glands absent or small, often inconspicuous jugary or interjugary glands irregularly present; pinnules usually 5–20 pairs; western Sydney species (CC) *Acacia pubescens*

Discussion

Within sect. *Botrycephalae*, there are currently 17 described *Acacia* taxa in Australia characterised by distinctly hairy branchlets, but only four of these possess velvety, setose or woolly pinnules. The setose bristles on the pinnule upper surface and lower midvein is distinctive in *Acacia wollarensis*, and is shared only with *A. cardiophylla* from the western slopes and plains of New South Wales. However, closer affinities seem to lie with *A. chrysotricha* from northern New South Wales, which shares features of the seed funicle and branchlet indumentum, and occupies a similar ecological niche. Geographically, the two taxa are separated by a distance of c. 300 km.

When describing the morphologically similar *Acacia chrysotricha*, Tindale (1966) noted that new recruitment and population expansion following fire was not expected to occur rapidly, although this reasoning was not detailed further. This assumed trait likely informed decisions to list this species as endangered in New South Wales. However, more recent information indicates that, like other *Acacia* species, fire events do trigger mass germination from the seed bank in this species. Initial estimates for *A. chrysotricha* of 1200 plants in 2000 were revised to between 14 500 and 15 000 following a single fire event in 2004, with plant densities persisting until at least 2009 (Richards 2011). Twelve months after a trial ecological burn in 2007, over 230 seedlings of *A. chrysotricha* were present in a 100 m² study area where previously only seven mature specimens were extant (M. Smith, pers. comm.). Given the dry habitats in which *A. wollarensis* occurs, and the paucity of observed young plants to date, it is expected that population expansion of a similar magnitude in this species will also be driven largely by fire events, but this aspect of the species ecology is yet to be tested. A trial germination found seed to be resistant to soaking in boiling water using standard horticultural techniques, with no imbibition evident. Manual nicking of the strophiole with a scalpel prior to cold water soaking resulted in all seed swelling to approximately three times their original size, with germination occurring after approximately five days. This suggests that intense fires may be required to successfully break dormancy in this species.

The Hunter Valley is known to support over one hundred described *Acacia*, but only eight are endemic to the region (*A. alaticaulis*, *A. bulgaensis*, *A. dangarensis*, *A. fulva*, *A. kulnurensis*, *A. piligera*, *A. serpentinicola* and *A. wollarensis*). All but one of these species occupy highly restricted distributional ranges, and three of them (*A. bulgaensis*, *A. dangarensis*, *A. fulva*) grow to be small trees like *A. wollarensis*. Preliminary research on the single population of *Acacia dangarensis*, similarly known only from Goulburn River National Park, displays comparable ecological traits to *A. wollarensis*. That species dominates the sub-canopy on steep slopes of a basalt plug, and attains heights of at least 10 m (Tindale & Kodela 1991), but can reach to 20 m (pers. obs.). The population of *A. dangarensis* has been shown to be comprised almost entirely of old or senescent trees, with limited replenishment, yet a viable seed bank is present (Bell & Elliott 2013). Both *A. bulgaensis* and *A. fulva* are typified by even-aged stands of mature trees in most locations, although major fire events in recent decades have enabled mass recruitment in some areas (Bell 2008).

Although at present only known from two locations, there is scope for additional stands of *Acacia wollarensis* to be found. This is despite the high level of general survey that has been expended within the wider Hunter region in recent decades. Currently occupied habitat of dry sheltered forest dominated by *Eucalyptus punctata*

and *E. sparsifolia* is not an uncommon feature of the upper Hunter Valley, with NSW OEH (2012) describing its Western Hunter Grey Gum – Stringybark Forest as occurring across nearly 12 000 ha in the Sydney Basin. It is somewhat surprising that such a distinctive, large species of wattle had not been previously encountered.

Acknowledgments

Thanks to Peabody Energy, Wilpinjong Mine, for facilitating access to properties supporting the new taxon. Information on the related *Acacia chrysotricha* was kindly provided by Martin Smith (NPWS). Phillip Kodela is thanked for reviewing a draft of this manuscript, and with Peter Wilson assisted in clarifying taxonomic formalities. Thanks also to Chris Rockley for preparing the line drawings, and Max Elliott for undertaking preliminary germination trials on the new species. Comments received from two referees improved the quality of the manuscript, and are gratefully appreciated.

References

- Bell SAJ (1997) *Vegetation Survey and Mapping of Crown Land, South of Manobalai Nature Reserve, Upper Hunter Valley*. Report to the Department of Land and Water Conservation and the NSW National Parks and Wildlife Service Upper Hunter District.
- Bell SAJ (2008) Rare or threatened vascular plant species of Wollemi National Park, central eastern New South Wales. *Cunninghamia* 10: 331–371.
- Bell SAJ, Driscoll C (2014) *Assessment and mapping of vegetation in the Bylong Valley: Authorisations 287 & 342*. Unpublished Final Report to Hansen Bailey Pty Ltd. Eastcoast Flora Survey. December 2014.
- Bell SAJ, Elliott M (2013) Preliminary results suggest fire is required to maintain *Acacia dangarensis*, a threatened single-population endemic from the Hunter Valley of NSW. *Australasian Plant Conservation* 22: 9–10.
- Department of Environment and Conservation (2004) *Munghorn Gap NR Survey, Central Directorate Data Priorities*. NSW Department of Environment and Conservation.
- Dojani S, Lakatos M, Rascher U, Wanek W, Lüttge U, Büdel B (2007) Nitrogen input by cyanobacterial biofilms of an inselberg into a tropical rainforest in French Guiana. *Flora* 202: 521–529. <https://doi.org/10.1016/j.flora.2006.12.001>
- Ecovision (2008) *Ecological Impact Assessment, Stage 2 of the Moolarben Coal Project, Ulan, New South Wales*. Unpublished Report Prepared by Ecovision Consulting, December 2008.
- Fallding M, Bell S, Murray M (1997) *Myambat Vegetation and Fauna Management. Guidelines for Landscape Management at the Myambat Logistics Company Site*. Prepared by Land and Environment Planning for the Department of Defence.
- FloraSearch (2005) *Wilpinjong Coal Project: Appendix HA Flora Assessment*. Unpublished Report Prepared by FloraSearch, March 2005.
- Hill L (1999) *Goulburn River National Park & Munghorn Gap Nature Reserve. Vegetation survey for fire management purposes*. Volumes 1 & 2. Report to NSW National Parks and Wildlife Service, Upper Hunter District. October 1999.
- IUCN (2001) *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. (IUCN, Gland, Switzerland and Cambridge, UK). ii + 30 pp.
- Jacobs (2014) *Myambat: Threatened species management*. Department of Defence. Final Report, July 2014. Jacobs Engineering Group Inc.
- NSW Office of Environment and Heritage (2012) *The Native Vegetation of North-west Wollemi National Park and Surrounds, including Nullo Mountain, Coricudgy and Cudgegong Areas. Volumes 1 & 2*. NSW Office of Environment and Heritage.
- Peake T (1999) *The vegetation of Manobalai Nature Reserve*. Unpublished Report prepared for NSW National Parks and Wildlife service, Muswellbrook.
- PlantNET (The NSW Plant Information Network System). Royal Botanic Gardens and Domain Trust, Sydney. <http://plantnet.rbgsyd.nsw.gov.au>
- Richards P (2011) *The Newry Golden Wattle (Acacia chrysotricha Tindale): Life History and Disturbance Ecology*. Unpublished Report prepared for Fishburn Watson O'Brien on behalf of Coffs Harbour Hardwoods.
- Tame T (1992) *Acacias of Southeast Australia*. (Kangaroo Press, Kenthurst)
- Tindale MD (1966) New taxa of *Acacia* from Eastern Australia. No. 1. *Contributions from the New South Wales Herbarium* 4: 19–23.

- Tindale MD, Kodala PG (1991) *Acacia tessellata*, *A. cangaiensis* and *A. dangarensis* (Fabaceae, Mimosoideae), three new species from northern New South Wales, Australia. *Australian Systematic Botany* 4: 579–589. <https://doi.org/10.1071/SB9910579>
- Wells Environmental Services (2011) *Mt Penny Coal Project: Preliminary Environmental Assessment*. Unpublished Report Prepared by Wells Environmental Services, February 2011.

Manuscript received 30 January 2017, accepted 18 April 2017